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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/752,722	01/03/2001	Tom Francke	1920-0119P	1214

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EXAMINER

SUNG, CHRISTINE

ART UNIT	PAPER NUMBER
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2878

DATE MAILED: 01/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/752,722

Applicant(s)

FRANCKE ET AL.

Examiner

Christine Sung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 January 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 January 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,3,5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Specification

1. Applicant should note the minor spelling error on page 11, line 15 where "materia" should be --material-- in the heading.
2. Applicant should note the minor spelling errors on page 6, line 23 where "isobuthane" should be --isobutane-- in the specification.
3. Applicant should also note on page 8, line 4, "cathode 17" should be --cathode 37-- in the specification.

Drawings

4. The drawings are objected to under 37 CFR 1.83(a) because they fail to show element 89, figure 5, as described in the specification, on page 18, line 20. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

5. Claim 7 is objected to because of the following informalities: In line 4 of claim 7, "isobuthane" should read --isobutane--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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7. Claims 6 and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 6, the phrase "optionally" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

The balance of claim 7 is rejected as being dependent from claim 6.

8. Claims 12 and 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 12 recites the broad recitation "solid state based

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detector", and the claim also recites "particularly a CCD-based detector" which is the narrower statement of the range/limitation.

The balance of claim 13 is rejected as being dependent from claim 12.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

10. Claims 1, 3, 4, 6, 8, 11, 13, 21, 22, 23, 27, 28, 29, 38 and 41 are rejected under 35

U.S.C. 102(e) as being anticipated by Lacy (US Patent 6,486,468).

Lacy describes a detection system that includes a chamber (figure 4, element 1), with a cathode and anode, filled with xenon gas (column 4, line 24), where radiation enters and is both ionized and converted into light through scintillation, (Column 4, lines 24-33) and is held at pressures greater than atmospheric pressures (Column 5 lines 19-28). He further describes that the detection system (Figure 4, element 5), comprises a photomultiplier tube (Column 4, line 33), for detecting the scintillated light and an avalanche arrangement, for detecting the electrons generated between the anode and cathode, for temporally (Column 4, lines 33-41) and spatially (Column 4, lines 41- 46) resolved detection. Lacy also describes a correlating means for correlating detected light and detected electrons (Column 4, lines 33-46) and also the ability to

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produce an output correlation signal (Column 4, lines 41-46). Lacy further describes that the light detector is arranged perpendicular to detect the incident gamma rays (See figure 4).

Lacy also discloses that his invention can be applied to medical imaging devices, such as PET (positron emission tomography), which inherently contains an object to be irradiated with light and formation of the image of the object using a gamma camera which contains the above disclosed detection arrangement (see abstract).

Lacy further describes in the abstract that a plurality of such detector arrangement (packed in array) are used for PET imaging.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lacy (US Patent 6,486,468)

As stated in the above-mentioned paragraphs, Lacy describes the limitations set forth in claim 1, but fails to address that the scintillation substance is specifically in a liquid or gas phase. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use an ionizable and scintillating substance in either the liquid or solid phase, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F 2d 197, 125 USPQ 416 (CCPA 1960)

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13. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lacy (US Patent 6,486,468) in view of Kruger (US Patent 5,311,010).

As stated in the above-mentioned paragraphs, Lacy describes the limitations set forth in claim 6, but fails to specifically describe the avalanche multiplication substance. Kruger describes a sensor with a separated anode and cathode containing an avalanche gas such as methane (Column 10, lines 6-7) in order to create a buffered system that eliminates chemical compatibility between the gas and the photocathode. It would have been obvious to one with ordinary skill in the art to have used a buffered system, such as the one described by Kruger, with Lacy's invention in order to reduce the interaction between the avalanche gas and the detector and produce enhanced avalanche multiplication, resulting in less error.

14. Claims 9, 10, 12, 13, 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lacy (US Patent 6,486,468) in view of Iwanczyk (US Patent 5,773,829).

Lacy describes in the abovementioned paragraphs, the limitations set forth in claims 1 and 8, but fails to address the specific use of a collimator and a detector arrangement where the chamber is divided into a plurality of compartments. Iwanczyk describes a radiation imaging detector that has a chamber divided into a plurality of radiation absorption cells separate by optical reflectors and heavy metal septa to reduce light and radiation scatter between the cells that are substantially parallel with the radiation entering the chamber. (See figure 1) It would have been obvious to one with ordinary skill in the art to use the imaging detector arrangement, as described by Iwanczyk, to improve the signal-to-noise ratio of the imaging system.

Further Iwanczyk describes the use of a plurality of light collimators (Figure 1, element 20) arranged in an array. It would have been obvious to one with ordinary skill in the art to use

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the collimator described in Iwanczyk in order to reduce attenuation of the incoming gamma rays, and increase the accuracy of the detected signals.

Further Iwanczyk describes the use of an array of photodetectors, which are solid state detectors, in his device to increase the spatial resolution and the fineness of the features of the object being imaged. (Column 2, lines 53-60) It would have been obvious to one with ordinary skill in the art to have used this array to detect the desired light radiation to increase the spatial resolution and the quality of the image being detected in Lacy.

15. Claims 14, 15 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lacy (US Patent 6,486,468) in view of Francke et al (US Pre Grant Publication 2001/0040937).

As mentioned above, Lacy describes the limitations set forth in claim 1 and further describes a photocathode (Column 7, lines 34-36), an electron avalanche amplifier (column 4, 27-28), and describes a readout process, but fails to state a specific read out arrangement. Francke demonstrates an imaging device that detects incident radiation with a gaseous avalanche chamber, with a readout arrangement array (Figure 4a, element 14) to detect avalanche amplified electrons. Since Lacy does not specify a certain type of conventional readout arrangement it would have been obvious to one having ordinary skill in the art to use the readout array as described in Francke as the readout system described in Lacy, in order to establish accurate signal readings for imaging.

16. Claims 16, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lacy (US Patent 6,486,468) in view of Francke (US Pre Grant Publication 2002/0040937) further in view of Durst (US Patent 6,340,819).

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Lacy in view of Francke describes the limitations set forth in claim 1 but fails to describe the electrical field concentration that accelerates the release electrons. Durst describes an avalanche detector arrangement whereby an electric field is used to accelerate the electrons between the anode and cathode. To enhance the drift of the electrons a wire mesh is inserted between the anode and cathode to further induce a drift of electrons corresponding to the applied electric field. Acceleration of the electrons would lead to quicker image readings, therefore it would have been obvious to one having ordinary skill in the art to have used this detector set up to decrease the time between image readings.

17. Claims 19, 20, 39 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lacy (6,486,468) in view of Wong et al (US Pre Grant Publication 2002/0121603).

Lacy describes the limitations set forth in claim 1, as described in the above-mentioned paragraphs, but fails to disclose that the light detection arrangement is adapted for energy resolved detection of light and that a single signal is produced dependent on the energy. Wong describes an apparatus used in gamma cameras and PET cameras, with scintillation detectors that measure energy resolution of light to create a signal from the energy detected. (See claim 1) It would have been obvious to one with ordinary skill in the art to measure the energy of the detected light in order to generate a signal corresponding to that energy to differentiate between light detection signals. Using energy resolution allows the device to differentiate different light measurements from each other, in the event that sequential signals pile up. It would have been obvious to one with ordinary skill in the art to use energy resolution with Lacy's disclosed invention to reduce erroneous large signals and to increase spatial and temporal resolution of the desired signals.

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18. Claims 30, 31, 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lacy (US Patent 6,486,468) in view of Nickles (US Patent 6,410,919).

As described in the above-mentioned paragraphs, Lacy discloses most of the limitations, but fails to specifically address the reconstruction means for performing a reconstruction process that calculates the amounts of emitted positrons from image volumes, and also fails to address a display unit for projecting an image. Nickles describes a PET apparatus that collects emitted positrons as they are emitted from the patient, and produce annihilation events. Then an image is reconstructed by using back projection method that indicates precisely the contours of the surface of the object being imaged.(Column 4, line54-Column 5 line14) It would have been obvious to one with ordinary skill in the art to use the image detection system as described by Nickles with the invention disclosed by Lacy, in order to reduce attenuation and increase image precision.

19. Claims 32, 33, 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lacy (US Patent 6,486,468) in view of Nickles (US Patent 6,410,919) further in view of Wong (US Pre Grant Publication 2002/0121603).

As described above, Lacy in view of Nickles discloses the limitations set forth in claim 35, but fails to disclose that the light detection arrangement is adapted for energy resolved detection of light and that a single signal is produced dependent on the energy. Wong describes an apparatus used in gamma cameras and PET cameras, with scintillation detectors that measure energy resolution of light to create a signal from the energy detected (See claim 1). It would have been obvious to one with ordinary skill in the art to measure the energy of the detected light in order to generate a signal corresponding to that energy to differentiate different light detection

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signals. Using energy resolution allows the device to differentiate different light measurements from each other, in the event that sequential signals pile up. It would have been obvious to one with ordinary skill in the art to use energy resolution with Lacy's disclosed invention to reduce erroneous larger signals and to increase spatial and temporal resolution of the desired signals.

20. Claims 40 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lacy (US Patent 6,486,468) in view of Wong (US Pre Grant Publication 2002/0121603) further in view of Iwanczyk (5,773,829).

Lacy in view of Wong discloses the limitations set forth in claim 39, but fails to specifically address the plurality of readout elements, arranged in an array, and a plurality of light detection elements arranged in an array. Iwanczyk describes a radiation imaging detector that has a chamber divided into a plurality of radiation absorption cells separate by optical reflectors and heavy metal septa to reduce light and radiation scatter between the cells that are substantially parallel with the radiation entering the chamber. It would have been obvious to one having ordinary skill in the art to use the detector arrangement as described by Iwanczyk with the invention as disclosed by Lacy and Wong, to increase the spatial resolution and the quality of the image being detected in Lacy and Wong.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christine Sung whose telephone number is 703-305-0382. The examiner can normally be reached on Monday- Friday 9-4 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 703-308-4852. The fax phone numbers for the

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organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-0956 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

CS

December 16, 2002



DAVID PORTA
SUPERVISORY PATENT EXAMINER
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